NITE-TIMES NEWS

CHICAGO AREA TIMEX USERS GROUP

VOLUME 3 ISSUE 2 MARCH-APRIL 1989

NITE-TIMES INFO

The Nite-Times News is the newsletter of the Chicago Area Timex Users Group. For an annual fee of $10.00 you can become a CATUG member with full membership privledges. Send your dues to CATUG Treasurer, Al Feng at 15 Wake Robin Ct, Woodridge, Illinois 60517. The Chicago Area Timex Users Group is pleased to exchange newsletters with other Timex and Sinclair supporting users groups. If you desire to reprint any articles that appear here, please provide credit to the author and this newsletter. If you have any suggestions or would like to submit an article, please mail it to:

The Chicago Area Timex Users Group
Nite-Times News Editor
1885A Yorktown Avenue
Great Lakes, Illinois 60088.

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CATUG MEETING NOTES

The last two meetings of the CATUG have stabilized with approximately a dozen members in attendance at each one. The February meeting was at the Downers Grove Libarary where a 747 Flight Simulator was demonstrated on a Spectrum emulated 2068. The Library wasn't available for the March meeting and Steve Cooper generously provided his home for the meeting. Using Steve's home allowed Bob Swoger to do an online demostration of the CATUG BBS.

Al Feng reported that the CATUG treasury currently sits at $259.97 to support it's twenty members. The following are the renewed members for 1989:

Paul Beatty	Jim Brezina
Jerry Cohler	Steve Cooper
Robert Curnett	John Donaldson
Mark Dorinson	Al Feng
Leo Majewski	Gary Lessenberry
Frank Mills	Jon Pagano
Nazir Pashtoon	Al Sherman
Larry Sauter	Bob Swoger
Greg Simmons	Lee Thoresen
John Ulreich	Butch Weinberg

UPCOMMING C.A.T.U.G. MEETINGS

The Chicago Area Timex Users Group meets on the second saturday of each month in the Downers Grove Public Library's Conference Room, from 12:00 to 5:00. The alternate site for our meetings is at 1300 Maple in Downers Grove. This alternate location is the residence of one of our members. Call Steve for directions.

Our next three meetings will be on May 13th, June 10th, and July 8th. The library is located at 1050 Curtiss Street in Downers Grove. The CATUG coordinator for our meetings is Steve Cooper and he can be contacted during the evening and on weekends at (312) 968-3553.

NITE-TIMES CLASSIFIEDS

The Nite-Times Classified Ads are a service provided to all of our readers. Please submit your ads prior to the 15th of each month. They may be mailed to the Nite-Times News Editor, 1885-A Yorktown Avenue, Great Lakes, IL 60088.

* * * * *

FOR SALE

$100.00 Used Sinclair QL (American version), in excellent condition, with some cartridges, software and books.
$ 70.00 Timex TS-1000 computer that's been recased with a TI-99 keyboard, a joystick port, a reset switch, a monitor/TV select switch, a power on indicator, and a power switch. Three TS-1016 RAM-Packs (one good and two bad), an assortment of TS-1000 software and books.
$ 50.00 TS2050 Modem in original case with several manuals and software.

For more information, contact:
Gary Lessenberry
(312) 473-9415

* * * * *

FOR SALE

$125.00 QL Printer complete with 3 ribbons ($5 S&H)
$35.00 TS-2050 Modem with case, docs and software ($3 S&H)
$35.00 Mathewson Keyboard Interface with 3' cable ($3 S&H)
$30.00 66 Key Keyboard, matrixed for TS-2068 ($3 S&H)
$25.00 TTL Monitor with docs, no case or pwr supply ($5 S&H)
$35.00 8K Hunter NVM for TS-1000 ($3 S&H)
$30.00 Two Tandon DSDD Disk Drives, need work ($5 S&H)
$25.00 TS-2020 Timex Tape Recorder ($3 S&H)
$30.00 Bell Systems Answering Machine ($3 S&H)

For more information contact:
TOM PHILLIPS
2942 Christopher Road
Jacksonville, Florida 32217
tel: 904/739-2580

* * * * *

FOR SALE

$80 - 2068 computer and software
$35 - 2050 modem and software
$25 - 2040 printer
$100 - QL 128K computer with software, Psion suite, Peintre, Monitor, Nucleon, ElecriQL Desk, and 7 mdv cartridges

All interested persons, please contact:
John Ulreich
203 Nauvoo, Park Forest, IL 60466
tel: 312/748-6004

* * * * *

FOR SALE

Large assortment of hardware, books and software for the TS-1000, TS-2068 and QL plus much more!
For more information, contact:
Barry Carter
P.O. Box 614
Warren, Michigan 48090
tel: (313) 537-8559

* * * * *

FOR SALE

ZENITH DATA SYSTEMS ZT-series Remote Terminal with built-in 300 baud modem, cables and power supply for 150.00 or best offer.
For more information, contact:
AL FENG
15 Wake Robin Court
Woodridge, IL 60517

CATUG LIBRARY NOTES

By Gary Lessenberry

The Chicago Area Timex Users Group Library has received the following listed articles from other user groups via our newsletter exchange. The newsletters with these articles will be available for check out at the monthly CATUG meetings.

The BoSTUG Newsletter (Jan/Feb 1989)
- Archive Character Codes
- The Strange One (QL Prog)
- QLand_Lord Review

CATS Newsletter (Feb/Mar 1989)
- Professional Publisher Review
- QL'n Packet
- TS-2068 ROM Disassembly

Cragist Newsletter (Feb 1989)
- Making Program Length Cassette Tapes

The Data Bus (Jan 1989)
- Timex/Sinclair News

The Data Bus (Mar 1989)
- Timex/Sinclair News

The Hacker (Feb 1989)
- Adventure Game (TS-2068 Prog)

The Hacker (Mar 1989)
- Slot Machine Simulation (TS-2068 Prog)

HATS Newsletter (Mar/Apr 1989)
- Altkeys To Boot
- Address (QL Archive Prog)

KATS Komputer Knews (Feb 1989)

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CATUG LIBRARY NOTES

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KATS Komputer Knews (Mar 1989)
I.S.T.U.G. Newsletter (Dec 88 - Jan 89)
  VU-Calc Wafadrive Conversion
  Improving "Linear Search"
I.S.T.U.G. Newsletter (Feb 89)
  VU-3D Wafadrive Conversion
  Recreational Mathematics On The ZX80
PACC Talk (Feb 1989)
PACC Talk (Mar 1989)
The Plotter (Mar 1989)
  Spectrum Software From UK To Your Mailbox
  Calculate A Sinking Fund
  Oliger SAFE V 2.5 Disk Operating System
The Plotter (Apr 1989)
  Chaos (QL Prog)
QZX Journal (March 1989)
  QL Data Interface
  EPROM Programmer, EP 1000
The Ramtop (Jan/Feb 1989)
  The World Of Fnet
  New Life For The QL
Sinc-Link (Mar/Apr 1989)
  ZX81 Midi Interface Project
  RLE Graphics
  Easy Keyboard Fix
  RS232 Interfaces
  EMY Extnbasic Multitasking
  Many Larkin Disk System Related Articles
SINCUS News (Mar/Apr 1989)
  Part 3, TS-1000 SCL Map
SLUG Newsletter (Jan 1989)
  Treasurers Report (Program)
SMUG Bytes (Feb 1989)
  Bill On QL BASIC
  Multitasking On The 2068
  QL "C" - The Two Versions
SMUG Bytes (Mar 1989)
  Bill On QL BASIC
  TS-2068 Clock
  Rudy's SQ Notes
TS Bulletin (Feb 1989)
VISTA Newsletter (Vol 3, No 1)
  ZX Turbo (ZX81 Prog)
WCUC User Amuser (Feb 1989)
ZX-Appeal (Feb 1989)
  MC Pointers, Part Two
  Variable Display Routine, Part Two
  A Touch Of Clazx (TS-1000 Prog)
  The ZX/TS True 64K Internal NVM Upgrade

TIMEX TIDBITS

Our Timex brethren in Milwaukee are producing Digitizers for the TS-2068. The cost of a completely assembled and tested unit with postage is $52.95 while the bare board alone costs $22.95! These prices include the software. For more information write to SMUG, P.O.Box 101, Butler, Wisconsin 53007.

RMG Enterprises have expaned their Timex/Sinclair inventory by acquiring the remaining Foote Software and E-Z Key stocks. For a complete listing of what is now available from RMG, send a S.A.S.E. to RMG Enterprises, 1419 1/2 7th Street, Oregon City, OR 97045.

RMG has the MAXCOMM software available for $25 in stock now. MAXCOMM is a modem Terminal/BBS program that operates at 1200 baud via the Z-SIO. It has been written by Larry Kenny for use with the LKDOS.

The latest BoSTUG Newsletter reports that the TIMEWARP BBS (tel: 508/481-0555) will be upgrading to 1200 baud at the end of March.

Anybody who resented the sale of Sinclair to Amstrad will be glad to hear that a recent issue of the Wall Street Journal reported that Amstrad took a 16% drop in their profits.

The Plotter has reported that MAXCOMXM, the Larken BBS/Terminal software is now available and that Larry Kenny has finished writing his Sequential Filing Program which will only need completion of it's documentation before being released. After that, Larry plans to write a Desk Top Publisher as well.

Zebra is selling out and and RMG Enterprises along with WMJ Data Systems are bidding for the remaining stock. During the interim however, Zebra will not accept any order for under $25!

Time Designs is alive and well, according to Tim Woods. Although it has fallen behind schedule, it is still in production. However, it is currently in a state of transition. There is every intention of keeping it going for many years to come. The last issue that hit the streets was the Sep/Oct issue. If you did not receive it or if you are having any other subscription difficulties, call their 24 hour answering machine at 503/824-2658 or write to TIME DESIGNS MAGVAZINE, 29722 Hult Road, Colton, Oregon 97017.

UPCOMMING CHICAGOLAND HAMFESTS

Hamfests are a great source for electronic components including computer parts such as disks drives. The following hamfest information was downloaded from the Samson FIDO BBS (tel: 312/394-0071):

05/06/89 08:00 Cederburg, Wi. $3.00
Info: (414) 692-2329
Ozaukee Radio Club 11th Annual Swapfest.
Circle B Recreation Center at the
Intersection of highway 60 and County I.

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UPCOMMING CHICAGOLAND HAMFESTS

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05/06/89 Sandwich, Il. $4.00
Kishwaukee Amateur Radio Club Hamfest. Sandwich Fairgrounds, Suydam Road, just north of Route 34.

05/21/89 09:00 Chicago, Il. $2.00
Info: (312) 869-HAMS or (312) 545-3622
Chicago Amateur Radio Club Annual Outdoor Mini- Hamfest. 5801 N. Pulaski Road, Chicago.

06/11/89 06:00 Willow Springs, Il. $4.00
32nd Annual Hamfest by the Six Meter Club of Chicago. Santa Fe Park at 91st and Wolf Road.

07/09/89 08:00 Downers Grove, Il. $3.00
Info: (312) 964-5529 (ask for Jim)
DuPage Amateur Radio Club Hamfest - Computer Show at the American Legion Grounds at 4000 Saratoga Street.

07/16/89 08:00 St. Charles, Il. $5.00
Info: (312) 231-0707 (ask for Phil)
Fox River Radio League Hamfest. Pheasant Run Lodge at Rt. 64 west of 59.

07/23/89 08:00 Berwyn, Il. $4.00
Info: (312) 712-5100
ACLR Hamfest '89. The Hall at 1535 S. Harlem Ave.

07/30/89 06:00 Peotone, Il. $4.00
Info: (312) 582-9776
Hamfesters Radio Club 1989 Hamfest. Will County Fairgrounds on Rt. 50. Half Mile East at RT 57 exit 327 (Peotone).

08/13/89 07:00 Valparaiso, In. $4.00
Porter County Amateur Radio Club 4th Annual Northwest Indiana Hamfest and Computer Fair. At "New" Porter County Fairgrounds, Rt. 49 and Division Rd.

09/10/89 Joliet, Il. $4.00
Bollingbrook Amateur Radio Society 5th Annual Ham/Computerfest '89. Inwood Recreation Center, 3000 W. Jefferson St.

09/16/89 06:00 Peoria, Il. $5.00
09/17/89 Peoria Area Amateur Radio Club Superfest '89. Exposition Gardens, West Northmoor Rd.

09/23/89 06:00 Grayslake, Il $5.00
09/24/89 Chicago FM Club Radio Expo '89. Lake County, Illinois Fairgrounds, Rt. 45 & 120.

10/15/89 07:00 Waukesha, Wi. $3.00
Kettle Moraine Radio Amateurs, Inc. Ham & Computer Swapfest. Waukesha County Expo Center Forum, Highways J & FT.

10/29/89 07:00 Grayslake, Il $3.00
Late Fall Hamfest. Rt. 45 & 120.

TS-2068 PROGRAMING TIPS

Reprinted from Synapse

==========
1st + 2nd Displays
==========

You can use this routine to move the Function Dispatcher so you can utilize the 2nd Dispatcher.

```
10 CLEAR 39999
20 FOR i=40000 to 40017
30 READ n:POKE i,n
40 NEXT i
50 DATA 1,254,254,205,153,100,62,2,205,142,14,1,255,0,205,89,
   252,201
```

After the 1st use, you then have to use these commands, otherwise you will BOMB OUT!

```
OUT 255,2 for the 2nd Display
OUT 255,0 for the 1st Display
```

==========
22nd + 23rd Display Lines
==========

If you would like to use the 22nd and 23rd line on the screen without using the INPUT command, use this command:

```
PRINT #1;AT 0,2;"Hi there!!"
PRINT #1;AT 1,5;"Bye Now!!"
```

The computer will continue to process the program which is fine unless you have to put a question or a prompt and are waiting for a response. In which case, you would have to put in a loop so that untill you got your needed answer, the program would not continue.

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TS-2068 PROGRAMING TIPS

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Just For Fun Try This

```
 1 CLS
 5 INK 0: ON ERR GO TO 1
10 INPUT INK 0;"Enter Number";n
15 IF n<210 THEN GO TO 10
17 IF n>800 THEN GO TO 10
20 INPUT INK ;"Enter Ink";i
25 IF i<0 THEN GO TO 20
30 IF i>7 THEN GO TO 20
35 CLS
40 INK i: PLOT 75,85: DRAW 50,50,n
42 REM 50,50 can be changed to 25,25
43 PRINT #1;AT 0,0;"PRESS Z for copy to PRINTER"
45 PRINT #1;AT 0,0;"Press any other key to conrinue"
46 IF INKEY$="" THEN GO TO 46
49 IF INKEY$="Z" THEN COPY:LPRINT "Number";n:LPRINT:LPRINT
50 GO TO 10
```

SCROLLING

If you POKE a number from 1 to 255 into the location 23692, the computer will scroll that many lines plus 21 (If there is that much text to be scrolled!). Otherwise, it will return to the beginning of the text and use that to print the number of lines that you estimated.

POKE 23692,#

= Any number from 1 to 255

Faster Control

If you have long text to edit and you feel like your computer is worn out before it starts, or if your laser guns aren't firing fast enough for you, try these commands (But BEWARE!):

POKE 23561,# (# = 1 to 35. For games 1 to 10; text 10 to 15)

POKE 23562,# (# = 1 to 5. For games 1 ; text 3)

BEEP For Typing

For those of you who are Hard of Hearing or just like to hear the reassuring beep of the typewriter keys, try this command:

POKE 23609,# (# = 1 to 255)

The sound will range from wood blocks to Morse Code. Please note that a value of 0 will disable the beep.

More Flags

For those of you that do some business programming where you would like to capitalize occasionally, her is a POKE for you!

POKE 23658,8 (CAPITALS)

POKE 23658,0 (Lower case)

TS-2068 MEMORY EXPANSION

By William J. Pedersen

MEMORY IMPROVES WITH AGE?

Crazy? Perhaps so, but survival of our favorite antique TS-2068 computer depends on it to a degree. Two advances are primarily responsible for this. Both extend the amount and speed of available memory, over and beyond that in the DOCK bank.

Disc drives improve speed, accessiblity and convenience pver tape recording.

RAMDISK has broken all speed records and has expansion possibilities which are impressive.

Now all we need to do is find some way to bank switch additional memory. It has been said that it can't be done because TIMEX expertise has been dispersed....DINOSAUR CHIPS!

While it is true that the system TIMEX intended (before killing it) is highly complex, it is NOT the only system which works. The one described in Figures 1 and 2 is just about the minimum bank switching system. There are a lot of feature like handling interrupts and autoconfiguring that are beyond it, but it can address 16 megabytes of memory and works with the unmodified TS-2068.

MEMORY BANK (Figure 2)

There is nothing particularly special about this memory bank. It decodes a 24 bit address and has a dip-switch to locate 64K of contiguous memory space at any 64K boundry.

ADDIf any of it's memory is active, it drives the BE signal low to disable LOCAL HOME, EXROM and DOCK banks. With this system it is impossible for two expansion banks to be on the bus at the same instant. (See Appendix A for greater detail.)

SYSTEM CONFIGURATION

There must be some way to MAP all or part of memory. The simplest way to do this is to write programs which assume contiguous memory up to a variable limit, and warn you when that limit is exceeded. For this, each expansion bank should have dip-switches set from 1 to MAXBANK in sequence.

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TS-2068 MEMORY EXPANSION

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There are better ways which allow unused available banks to be switched around where needed; saving $$$$. This needs some programming overhead, but you have room for it.

AUTO CONFIGURATION

This is where the computer is programmed to go out to explore the neighborhood. Whatever it finds is recorded into a sytem configuration table (SYSCON) for later reference.

THIS IS NOT EASY!

A DUMB device cannot be found because it cannot answer a rool-call. It is deaf to attention-getting methods. It can be made visible by attaching a baby-sitter chip which can respond and identify itself and the attached device.

A SMART device listens, answers, and often calls for attention. Still, it must also accept an order to shut up so it won't interupt. The IEEE488 system is a system for standardizing command language between widely different computers and devices, but it is still not smart enough to keep quiet when another device with the same "name" is on the system bus.

Duplicate names can be resolved if they are at different addressable locations. In this way, one of the names can be changed to avoid future confusion and wasted time. It only needs to be done initially, or when some outside event has created another duplication (Like turning on a disc drive).

A DAISY CHAIN is one way to resolve the unique address problem. Another common method is to give back-plane slots an address on a temporary basis (perhaps evpandable using a DAISY CHAIN). Both methods assume something about the design of the connecting NETWORK. It must guarantee reaching only one device at a time.

NETWORKING

Almost by definition, a network is where Murphy lives. Frequently the unexpected happens. No more than three points will be made here.

1. Statistical methods must be used to find time slots when bus confusion is absent by chance.
2. If this works, there is no need for physical unique addresses, though default names still help.
3. Any device connected to a network can help by introducing a random delay to that natural to the system.

BANK SWITCHING

A bank switching controller (BSC) is essentially a network switchboard. The TS-2068 operating system expects eight equal 8K wide channels assigned arbitrarily to CHUNKS.

The Z80, like most CPU's, has channels to internal registers; and internally swaps between register sets. It is a bank switching controller itself.

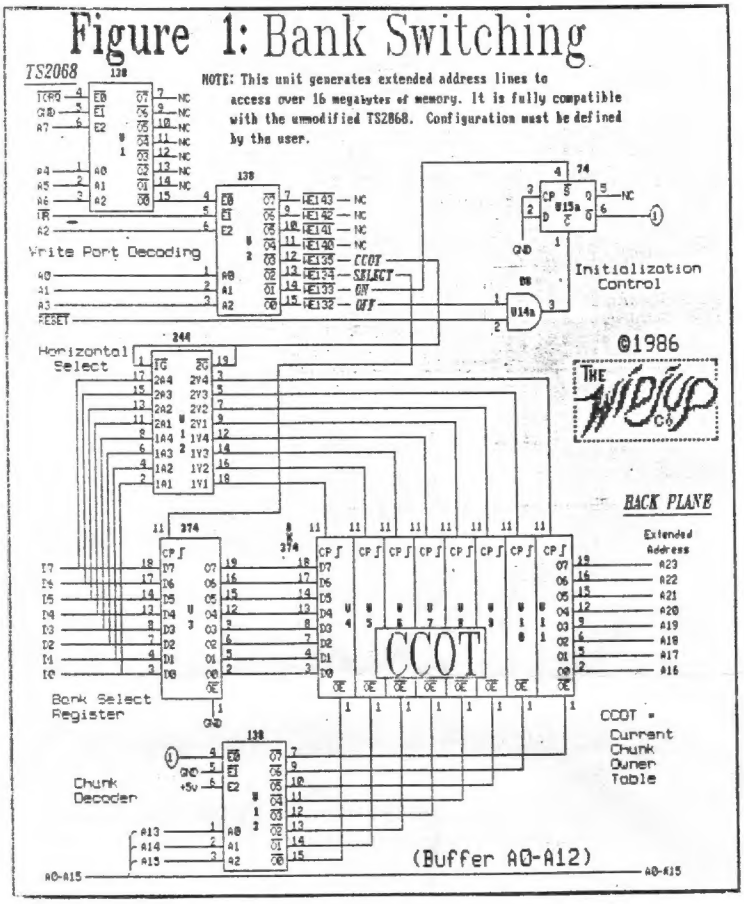

Figure 1: Bank Switching

Machine code includes extended adressing provided by additional fetched bytes. Prefix bytes allow instruction sets to be bank switched.

The 8088 CPU used in the IBM PC and clones has four dedicated internal bank switching registers whereas the Z80 has none. This idealistic approach for the 8088 worked like a charm until it ran into deep water. It outgrew its island and could build a boat. Externally, bank switching registers do not have these limitations.

The BSC in Figure 1 is similar to the one inside the 8088, but there the resemblance ends. It has eight channels instead of four, and can address sixteen times as much space.

There are better BSCs than the one in Figure 1, but this one does a POWERFUL job. It also requires no alteration of your precious TS-2068...a good compromise.

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TS-2068 MEMORY EXPANSION

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BANK SWITCHED OPERATION

The most significant three bits of Z80 address space are used to select one of eight previously established address extension bytes in a current chunk owner table (CCOT). The remaining bits address locations within each 8K channel.

When power is first turned on, and at other times when the TS-2068 needs exclusive control, CCOT must be turned off. Turning it ON could be a problem.

Fortunately, we can first assing all eight channels to HOME. The extended address is 255 for which nothing usually responds. Then nothing happens when CCOT is turned ON. (The "usually" reference is explained later.)

With CCOT turned OFF, extended address bits float, unless something is connected to force them high. In effect, the OFF condition also gives 255 for the extended address. That is exactly why HOME bank was assigned that bank number.

BANK SWITCHING CONTROL

Except during power-up, there is no safe place in physical memory to put bank switching code. Only the fetched instruction in the Z80 is immune. That instruction must be able to find the BSC regardless of memory assignments. It must use I/O (another example of Z80 bank switching). Because GO TO and CALL are not I/O instructions, and the machine stack is unsafe anyway, each bank chunk using these needs to supports them with MACROs having the same effect. The same applies to the RETurn instruction.

The most elegant method avoids using these by continuing the code in the shadowing bank and leaving the chunk with the current machine stack untouched.

This flexibility is what makes multitasking and multiuser time sharing systems remarkably easy to create. Each user can have his own private partition under control of a SUPERVISOR. Security from program interference remains a problem with the Z80, not like other CPUs which provide priviledged instructions. Certain programming conventions will have to be followed to compensate for this.

There is great preasure to reserve one chunk to one bank to hold the system variables (SYSVARs), machine stack and bank switching routines. This is the technique used in the relics of machine code remaining in the unmodified TS2068. If repeated in each user's partition, this is a good convention to use. It should be remembered that it is still a convention, and need not be followed.

The relics use memory mapped bank switching ports. Unless these port addresses are forbidden to be used in all banks, it doesn't work. The BUG consists of stacking the port byte from one bank and restoring it in another, thereby destroying it in the new bank. There is a way to switch stacks to resolve this problem, but is too complex for serious consideration.

Global SYSVARs can be stored in I/O space, so this is not a real difficulty. The same applies to a bank switching stack run by the MACROs already mentioned. AN alternative for the bank switching stack is to dedicate a fixed bank and chunk for it, though this has the problem of not remaining safe from accident.

MOST OF THIS DOES NOT APPLY TO THE BSC IN Figure 1. IT HAS BEEN INCLUDED TO SHOW WHAT CAN BE DONE WITH A MORE ADVANCED VERSION.

Control is simple. This BSC is write-only. It has eight ports of which only four are presently used. The port assignments avoid those to which the ZX and TS-2040 printers respond and all known physical tnerface ports like the MODEM and TASMAN.

PORT	DATA	FUNCTION
132	x	Turn CCOT OFF
133	x	Turn CCOT ON
134	Bank#	Owner to be posted to CCOT
135	"HS"	CHUNK mask, active LOW

Bank# is identical to the extended address byte. OUT 134, Bank# writes the bank number into a register which maintains it as input to CCOT.

"HS" is the "Horizontal Select" described by TIMEX. Looking at the structure of CCOT, it makes sense.
OUT 135, HS latches the stored Bank# into CCOT registers for which HS bits are active LOW.

Some of the more significant bits can be ignored in smaller systems, which explains why EXROM is Bank #254 and DOCK is Bank #0. A system using only the lower nibble can still address 1 megabyte of memory.

Control can be safer from accident by using one of the unused ports to act as "SIMON SAYS". This was the real purpose of the TIMEX RESET NIBBLE SEQUENCE bank switching instruction, though never explained.

EXCEPTIONAL CONDITIONS

Bank numbers from 1 through 253 are gravy, but what about HOME (255), EXROM (254), and DOCK (0)? Can they be implemented as real external banks? The answer is definitely yes, with some limitations.

HOME ROM can be replaced with EPROM at the drop of a hat. An almost trivial case is replacing it with SPECTRUM ROM. What is NOT trivial is the resulting SPECTRUM having bank switching capabilities! Repairs to the TS-2068 ROM code can be made in EPROM with impunity. Unlike other banks, bank 255 is active immediately at power-up. Because SPECTRUM is a subset of TS-2068, it remains a toy with which to play. The real power lies in installing upward compatible extensions to BASIC and to restore TIMEX disabled functions like OPEN, CLOSE, RESET and CATalogue. (continued on page 8)

TS-2068 MEMORY EXPANSION

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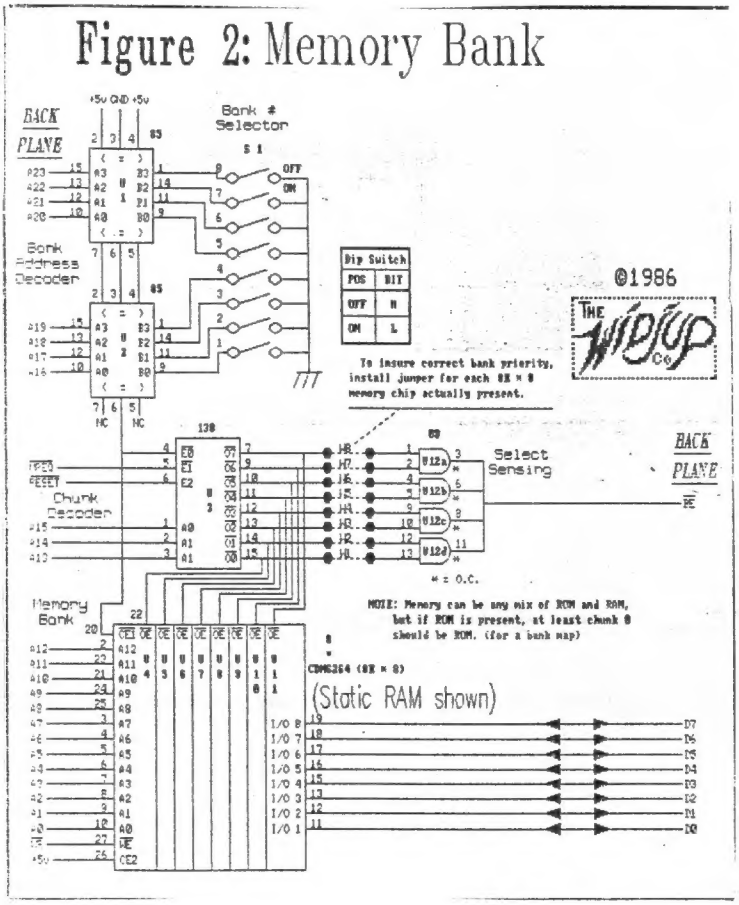


EXROM cannot be directly replaced without removing it from the case, and even then, it is not available during power-up. The problem with internal EXROM is that it is incompletely addressed so an image of ot appears in all chunks, not just chunk 0. The addressing problem can be solved by moving the chip to a special card which plugs into the cartridge slot. This card doesn't change anything except to provide full addressing to suppress the false images. Of course, if EXROM is replaced with EPROM, you can make repairs to code. In any case, you now have chunks 1 thru 7 of Bank #254 (enabled by EXROM signal) which you are free to use. On the expansion bus Bank #254 will have priority over this, but it is not active during initialization.

DOCK is usually enabled by the ROSCS signal available at the cartridge slot. If you relocated it to the expansion bus as Bank #0, it has priority when ON, or can act the same because the ROSCS signal is available on the expansion bus.

If you have no back-plane, the EXROM relocation card is the perfect place to include replacement HOME ROM using a technique described in another article for recovering the ROMCS signal logically--as it is not available at the cartridge slot.

For the same reason, the card should carry a replacement card edge connector so you can still use your cartridges.

Should you desire, once the system has been initialized, and you DO have an expansion bus, even these replacements can be replaced by the external higher priority back-plane cards. When this is done, EXROM and DOCK are no longer mutually exclusive.

SUMMARY

While the Bank Switching System described in Figures 1 and 2 has limits on what it can do, it should start a revolution.

It is simple enough to understand, uses easily obtainable parts, and any reasonably competent hardware hacker can build it. It doesn't put your TS-2068 at risk, and even if EXROM is relocated, there are no wiring changes internally so you can always put it back.

A lot of mental sweat went into creating this version. The main reason for it is to give the user confidence that it can indeed be done as advertised. Perhaps later someone will actually believe that a full self-configuring system actually exists (which it does).

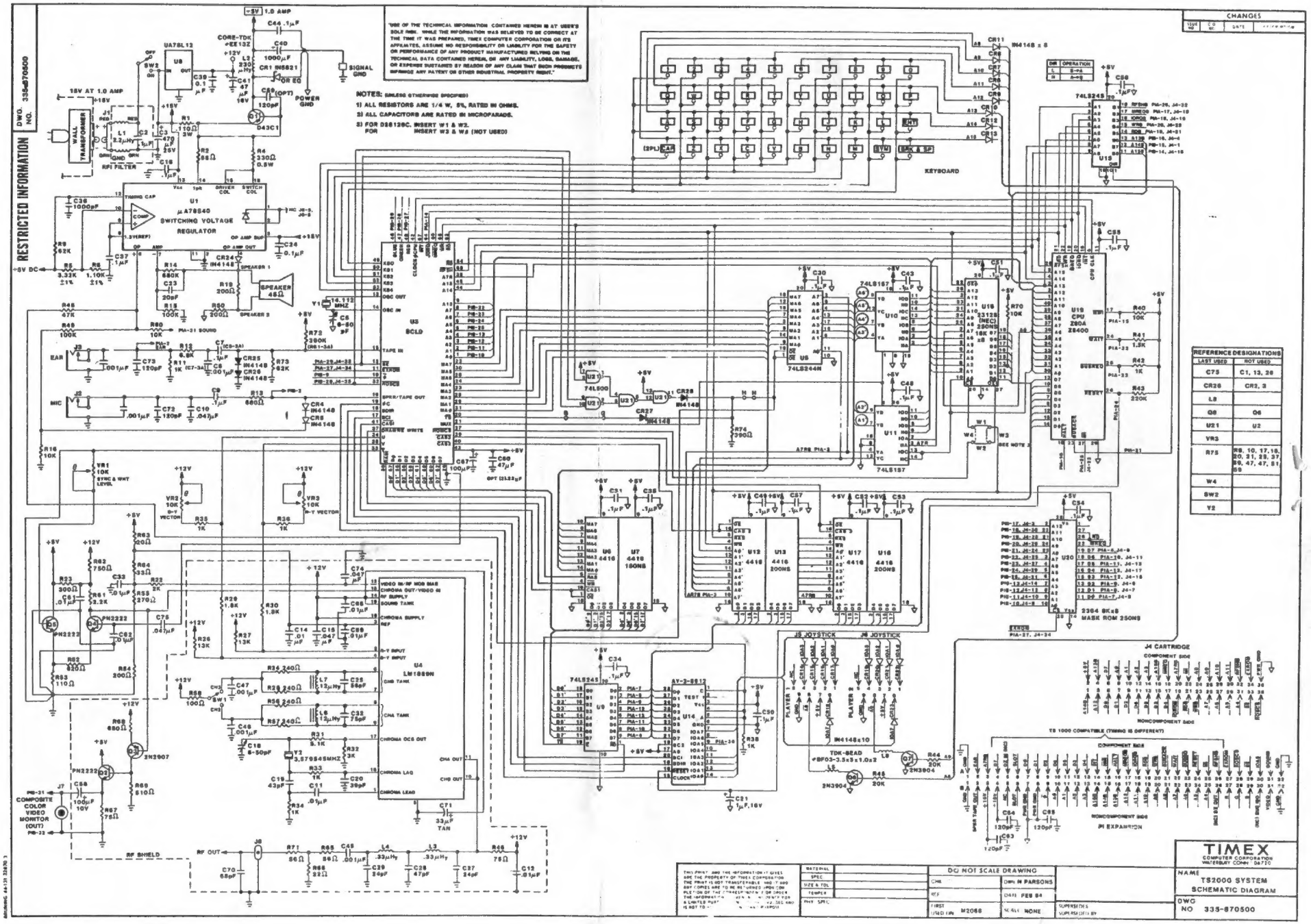
It nevertheless is one GIANT STEP for the TS-2068. Once taken...watch out!

SURVIVALIST NOTES

Each month, we will try to include scematics for various pieces of Timex and Sinclair equipment. This month, we are providing a schematic of a TS-2068 Computer.

If you have have some schematics or any other items of interest that you would like to share with your fellow Timexers, send them to:

Editor, Nite-Times News
1885-A Yorktown Avenue
Great Lakes, IL 60088


RESTRICTED INFORMATION
DWG. NO. 335-870500
NOTES: (UNLESS OTHERWISE SPECIFIED)
1) ALL RESISTORS ARE 1/4 W, 5%, RATED IN OHMS.
2) ALL CAPACITORS ARE RATED IN MICROFARADS.
3) FOR D16129C, INSERT W1 & W2.
FOR INSERT W3 & W5 (NOT USED)
CHANGES
REFERENCE DESIGNATIONS
LAST USED
NOT USED
C75
C1, 13, 28
CR26
CR2, 3
L8
Q8
Q6
U21
U2
VR3
R75
R9, 10, 17, 18, 20, 21, 23, 37, 46, 47, 47, 51, 59
W4
SW2
Y2
KEYBOARD
J4 CARTRIDGE
COMPONENT SIDE
SOLDER SIDE
TS 1000 COMPATIBLE (TIMING IS DIFFERENT)
P1 EXPANSION
TIMEX
COMPUTER CORPORATION
WATERBURY CONN 06720
NAME
TS2000 SYSTEM
SCHEMATIC DIAGRAM
DWG NO 335-870500
DO NOT SCALE DRAWING
DRN IN PARSONS
DATE FEB 84
SCALE NONE

THE CHICAGO AREA TIMEX USERS GROUP MEETS AT 12:00
ON THE THIRD SATURDAY OF
EVERY MONTH IN THE
CONFERENCE ROOM OF THE
DOWNERS GROVE PUBLIC
LIBRARY LOCATED AT 1050
CURTISS STREET IN DOWNERS
GROVE

CHICAGO AREA TIMEX USERS GROUP
1885A YORKTOWN AVENUE
GREAT LAKES, ILLINOIS 60088